

Migrate HP-UX raw devices to ASM

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Abstract

This document describes the migration of HP-UX raw devices (LVM) used for Oracle data files to Automatic Storage Management (ASM).

1 A brief introduction

Automatic Storage Management (ASM) is a new feature in Oracle10g that alleviates the DBA from having to manually manage and tune disks used by Oracle databases. ASM provides the DBA with a file system and volume manager that makes use of an Oracle instance (referred to as an ASM instance) and can be managed using either SQL or Oracle Enterprise Manager.

2 Overview

- HP-UX 11iv2 (11.23)
- Oracle Database 10g (10.2.0.1)
- General purpose database
- Database files are located on LVM raw devices

3 Prepare for migration

To create the ASM instance, configure CSS, create administration directory tree, the password file and the parameter file.

3.1 Configuring Oracle Cluster Synchronization Services (CSS)

Automatic Storage Management (ASM) requires the use of Oracle Cluster Synchronization Services (CSS), and as such, CSS must be configured and running before attempting to use ASM. The CSS service is required to enable synchronization between an ASM instance and the database instances that. In a non-RAC environment, the Oracle Universal Installer will configure and start a single-node version of the CSS service and it is installed in and runs from the same Oracle home as the Oracle database.

In the case where the CSS process is not configured to run on the node, you can do this by running localconfig script:

```

$ su
# $ORACLE_HOME/bin/localconfig all
/etc/oracle does not exist. Creating it now.
Successfully accumulated necessary OCR keys.
Creating OCR keys for user 'root', privgrp 'root'..
Operation successful.
Configuration for local CSS has been initialized

Adding to inittab
Startup will be queued to init within 90 seconds.
Checking the status of new Oracle init process...
Expecting the CRS daemons to be up within 600 seconds.

CSS is active on these nodes.
europa
CSS is active on all nodes.
Oracle CSS service is installed and running under init(1M)

```

3.2 Create Admin Directories for ASM instance

We start by creating the admin directories from the ORACLE_BASE. The admin directories for the existing database on this node, (TESTDB), is located at \$ORACLE_BASE/admin/TESTDB. The new +ASM admin directories will be created alongside the TESTDB database:

```

mkdir -p $ORACLE_BASE/admin/+ASM/bdump
mkdir -p $ORACLE_BASE/admin/+ASM/cdump
mkdir -p $ORACLE_BASE/admin/+ASM/hdump
mkdir -p $ORACLE_BASE/admin/+ASM/pfile
mkdir -p $ORACLE_BASE/admin/+ASM/udump

```

3.3 Create ASM Instance Parameter File

In this step, we will manually create an instance parameter file for the ASM instance. This is actually an easy task as most of the parameters that are used for a normal instance are not used for an ASM instance. Note that you should be fine by accepting the default size for the database buffer cache, shared pool, and many of the other SGA memory structures. The only exception is the large pool. I like to manually set this value to at least 12MB. In most cases, the SGA memory footprint is less than 100MB. Let's start by creating the file init.ora and placing that file in \$ORACLE_BASE/admin/+ASM/pfile. The initial parameters to use for the file are:

```
$ORACLE_HOME/dbs/init+ASM.ora:
```

```

instance_type=ASM
db_unique_name=+ASM
asm_diskstring='/dev/vg00/r*'
asm_diskgroups=DG1
large_pool_size=16M
user_dump_dest=/oracle/admin/+ASM/udump

```

```
background_dump_dest=/oracle/admin/+ASM/bdump
core_dump_dest=/oracle/admin/+ASM/cdump
remote_login_passwordfile=exclusive
```

3.4 Create ASM password file

```
$ORACLE_HOME/bin/orapwd file=$ORACLE_HOME/dbs/initpw+ASM password=r1r2r3
```

3.5 Create LVM raw device to be used as an ASM disk

```
lvcreate -L 10240 -n lvasm1 vg00
chown oracle:dba /dev/vg00/rlvasm1 /dev/vg00/lvasm1
```

3.6 Start the ASM instance

Startup the instance. Once the instance parameter file is in place, it is time to start the ASM instance. It is important to note that an ASM instance never mounts an actual database. The ASM instance is responsible for mounting and managing disk groups.

```
oracle@europa:/home/oracle$ export ORACLE_SID=+ASM
oracle@europa:/home/oracle$ sqlplus /nolog
```

```
SQL*Plus: Release 10.2.0.1.0 - Production on Fri Jun 29 12:07:56 2007
```

```
Copyright (c) 1982, 2005, Oracle. All rights reserved.
```

```
SQL> conn / as sysdba
Connected to an idle instance.
SQL> startup
ASM instance started
```

```
Total System Global Area 134217728 bytes
Fixed Size 1992000 bytes
Variable Size 107059904 bytes
ASM Cache 25165824 bytes
ORA-15032: not all alterations performed
ORA-15063: ASM discovered an insufficient number of disks for diskgroup "DG1"
```

```
SQL>
```

execute the following statement to see your disk:

```
SQL> SELECT group_number, disk_number, mount_status, header_status, state, path FROM
v$asm_disk where header_status='CANDIDATE';
```

```
GROUP_NUMBER DISK_NUMBER MOUNT_S HEADER_STATU STATE PATH
```

```
0 10 CLOSED CANDIDATE NORMAL /dev/vg00/rlvasm1
```

```
SQL>
```

Note the value of zero in the GROUP_NUMBER column for all four disks. This indicates that a disk is available but hasn't yet been assigned to a disk group

3.7 Create ASM disk group

```
SQL> create diskgroup DG1 external redundancy disk '/dev/vg00/rlvasm1';
```

Diskgroup created.

```
SQL> SELECT group_number, disk_number, mount_status, header_status, state, path FROM v$asm_disk where header_status='MEMBER';
```

GROUP_NUMBER	DISK_NUMBER	MOUNTS	HEADER_STATU	STATE	PATH
1	0	CACHED	MEMBER	NORMAL	/dev/vg00/rlvasm1

```
SQL> select state from v$asm_diskgroup;
```

```
STATE
```

```
-----  
MOUNTED
```

3.8 Prepare database for migration

```
SQL> create pfile from spfile;
```

add the following lines to pfile:

```
.db_create_file_dest=+DG1  
.db_create_online_log_dest_1=+DG1  
.control_files='+DG1/testdb/controlfile/control01'
```

Determine whether block change tracking is enabled. If block change tracking is enabled, then disable change tracking by running the following commands:

```
SQL> select * from V$BLOCK_CHANGE_TRACKING;  
SQL> ALTER DATABASE DISABLE BLOCK CHANGE TRACKING;
```

Now you can start with the RMAN migration of your Oracle Database 10g raw devices to ASM.

4 Migration

4.1 Start database in nomount state

Start up the Oracle Database 10g instance with the current initialization parameter file using RMAN.

```
oracle@europa:/home/oracle$ rman target /
```

```
Recovery Manager: Release 10.2.0.1.0 - Production on Fri Jun 29 13:29:26 2007
```

```
Copyright (c) 1982, 2005, Oracle. All rights reserved.
```

```
connected to target database (not started)
```

```
RMAN> startup nomount pfile=/oracle/ora10g/dbs/inittestdb.ora;
```

```
Oracle instance started
```

```
Total System Global Area 771751936 bytes
```

```
Fixed Size 1996880 bytes
```

```
Variable Size 209717168 bytes
```

```
Database Buffers 557842432 bytes
```

```
Redo Buffers 2195456 bytes
```

```
RMAN>
```

4.2 Restore control file and mount database

RMAN will read the controlfile from the existing location to store the controlfile in ASM:

```
RMAN> restore controlfile from '/dev/vg00/rlvtestdb_control01_raw_110m';
```

```
Starting restore at 29-JUN-07
```

```
allocated channel: ORA_DISK_1
```

```
channel ORA_DISK_1: sid=156 devtype=DISK
```

```
channel ORA_DISK_1: copied control file copy
```

```
output filename=+DG1/control01
```

```
Finished restore at 29-JUN-07
```

```
RMAN> alter database mount;
```

```
database mounted
```

```
released channel: ORA_DISK_1
```

```
RMAN>
```

4.3 Copy database

Using the RMAN command shown in the following example, RMAN copies the datafiles from the logical volumes to the ASM diskgroup (specified with *.db_create_file_dest=+DG1):

```
RMAN> backup as copy database format '+DG1';
```

```
Starting backup at 29-JUN-07
allocated channel: ORA_DISK_1
channel ORA_DISK_1: sid=156 devtype=DISK
channel ORA_DISK_1: starting datafile copy
input datafile fno=00002 name=/dev/vg00/rlvtestdb_undotbs01_raw_2048m
output filename=+DG1/testdb/datafile/undotbs1.257.626535775 tag=TAG20070629T134254
recid=1 stamp=626535904
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:02:15
channel ORA_DISK_1: starting datafile copy
input datafile fno=00004 name=/dev/vg00/rlvtestdb_users01_raw_2048m
output filename=+DG1/testdb/datafile/users.258.626535911 tag=TAG20070629T134254 re-
cid=2 stamp=626536030
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:02:06
channel ORA_DISK_1: starting datafile copy
input datafile fno=00001 name=/dev/vg00/rlvtestdb_system01_raw_512m
output filename=+DG1/testdb/datafile/system.259.626536035 tag=TAG20070629T134254 re-
cid=3 stamp=626536080
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:00:55
channel ORA_DISK_1: starting datafile copy
input datafile fno=00003 name=/dev/vg00/rlvtestdb_sysaux01_raw_512m
output filename=+DG1/testdb/datafile/sysaux.260.626536091 tag=TAG20070629T134254 re-
cid=4 stamp=626536127
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:00:45
channel ORA_DISK_1: starting datafile copy
copying current control file
output filename=+DG1/testdb/controlfile/backup.261.626536137 tag=TAG20070629T134254
recid=5 stamp=626536136
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:00:03
Finished backup at 29-JUN-07
```

At this point, switch your target database to use the datafiles that RMAN copied to the ASM diskgroup:

```
RMAN> switch database to copy;
```

```
datafile 1 switched to datafile copy "+DG1/testdb/datafile/system.259.626536035"
datafile 2 switched to datafile copy "+DG1/testdb/datafile/undotbs1.257.626535775"
datafile 3 switched to datafile copy "+DG1/testdb/datafile/sysaux.260.626536091"
datafile 4 switched to datafile copy "+DG1/testdb/datafile/users.258.626535911"
```

Open the database:

```
RMAN> alter database open;
```

database opened

```
RMAN> quit
```

4.4 Re-create online redologs

The Controlfile(s) and datafiles including the UNDO files are located on ASM. However, the RMAN "backup as copy command" does not copy the online redo log files or the temporary files and you need to re-create these files:

```
SQL> select name from v$datafile;
```

```
NAME
```

```
-----
+DG1/testdb/datafile/system.259.626536035
+DG1/testdb/datafile/undotbs1.257.626535775
+DG1/testdb/datafile/sysaux.260.626536091
+DG1/testdb/datafile/users.258.626535911
```

```
SQL> select GROUP#,MEMBER from v$logfile;
```

```
GROUP# MEMBER
```

```
-----
1 /dev/vg00/rlvtestdb_redolog1_01_raw_128m
2 /dev/vg00/rlvtestdb_redolog1_02_raw_128m
```

```
SQL> alter database add logfile member '+DG1/testdb/onlinelog/redolog1_03' to group
1;
```

Database altered.

```
SQL> alter database add logfile member '+DG1/testdb/onlinelog/redolog1_04' to group 2;
```

Database altered.

```
SQL> select group#, status, type, member from v$logfile;
```

```
GROUP# STATUS TYPE MEMBER
```

```
-----
1 (null) ONLINE /dev/vg00/rlvtestdb_redolog1_01_raw_128m
2 (null) ONLINE /dev/vg00/rlvtestdb_redolog1_02_raw_128m
1 INVALID ONLINE +DG1/testdb/onlinelog/redolog1_03
2 INVALID ONLINE +DG1/testdb/onlinelog/redolog1_04
```

```
SQL> alter system switch logfile;
```

System altered.

```
SQL> alter database drop logfile member '/dev/vg00/rlvtestdb_redolog1_01_raw_128m';
```

Database altered.

```
SQL> alter system switch logfile;
```

System altered.

```
SQL> alter database drop logfile member '/dev/vg00/rlvtestdb_redolog1_02_raw_128m';
```

Database altered.

After migrating the redo logs from the shared volumes to ASM:

```
SQL> select group#, status, type, member from v$logfile;
```

GROUP#	STATUS	TYPE	MEMBER
1 (null)	ONLINE	+DG1/testdb/onlineolog/redolog1_03	
2 (null)	ONLINE	+DG1/testdb/onlineolog/redolog1_04	

4.5 Re-create and temporary tablespace:

Manually create a temporary tablespace (tempfile). Because the control files do not have a record for the temporary tablespace, RMAN does not migrate or overwrite the tempfile. Thus, re-create the temporary tablespace manually in ASM using the following command:

```
SQL> create temporary tablespace temp_tempfile extent management local;
```

Tablespace created.

4.6 Create spfile and restart database

After the migration is complete, enable change tracking if it was enabled before the migration by running the following command: `SQL> ALTER DATABASE ENABLE BLOCK CHANGE TRACKING;`

In addition, move the spfile to ASM using the following command:

```
SQL> create spfile='+DG1/testdb/parameterfile/spfiletestdb.ora' from pfile='/oracle/ora10g/dbs/inittes
File created.
```

```
SQL> shutdown immediate
```

Update the initialization parameter file to point to the new location of the spfile on ASM as in the following example:

```
oracle@europa:/oracle/ora10g/dbs$ cat > inittestdb.ora
SPFILE='+DG1/TESTDB/PARAMETERFILE/spfiletestdb.ora'
```

```
SQL> show parameter spfile
```

NAME	TYPE	VALUE
spfile	string	+DG1/testdb/parameterfile/spfiletestdb.ora

```
SQL> exit
```

4.7 Finish

With this, the migration from raw devies to ASM is completed. Now you can safely remove the raw devices. The whole procedure does not take long time and its not risky, but anyway you have to be careful!